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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of Hiroyuki Otaki et al.

Serial No.: 10/626,908

Filed: July 25, 2003

For: VOLUME HOLOGRAM TRANSFER FOIL

**DECLARATION UNDER 37 CFR 1.132**

Honorable Commissioner of Patents and Trademarks,  
P. O. Box 1450, Alexandria, VA 22313-1450

Sirs:

I, Nobuko OIKAWA, a Japanese citizen, residing at 1-1, Ichigaya-Kagacho 1-chome, Shinjuku-ku, Tokyo-to, Japan, hereby declare and state that I graduated in 1994 from Graduate School of Science and Engineering of Waseda University with a degree of Master of Pure and Applied Physics, and that I have been employed by Dai Nippon Printing Co., Ltd. (assignee of the present application) from 1994 and I am now belong to Research & Development Center, Optical Device Laboratory.

I also declare that I have read all of the documents concerning the above-entitled patent application, and am familiar with the contents of the present inventions in this application.

I further declare that the following experiment was conducted by myself and that the result of the experiment is all true and correct to the best of my own knowledge.

**[Experiment]**

Experiment was conducted in accordance with the following items.

1. Object of Experiment
2. Experiment

3. Evaluation
4. Conclusion

1. Object of Experiment

In the Office Action issued on January 14, 2008 regarding the US Patent Application No. 10/626,908 (hereinafter, the present application), the Examiner rejects the volume hologram transfer foil recited in Claim 1 of the present application (hereinafter, the volume hologram transfer foil of the present application) as being obvious for a person skilled in the art over US Patent No. 5,342,672 (hereinafter, Killey), US Patent No. 6,066,378 (hereinafter, Morii) and EP 1,022,625 (hereinafter, Shioda). To prove that the volume hologram transfer foil of the present application is not obvious over a combination of Killey, Morii and Shioda, a further experiment was conducted.

Specifically, fine particles used in Morii was added into the heat sensitive adhesive layer of the transfer film disclosed in Shioda by the ratio applied in Killey and the respective breaking strain at 25°C of the heat sensitive adhesive layer and the volume hologram layer were measured. An object of the experiment is to prove that the respective breaking strain thereby measured do not meet the ranges which are recited as subject matters of Claim 1 of the present application and specified in the below (A) and (B).

- (A) A breaking strain at 25°C of the heat sensitive adhesive layer is in a range of 0.5% to 15%.
- (B) A difference in the breaking strain at 25°C between the volume hologram layer and the heat sensitive adhesive layer is 7.5 % or less.

2. Experiment

- (1) The same volume hologram layer as the one used in Example 1 of the present application was used and a composition thereof is listed in Table 1. The reason of using the volume hologram layer of Example 1 as the volume

hologram layer of Shioda was because Shioda discloses that all conventional volume hologram-recording materials such as photopolymerizable resins can be used as the volume hologram-forming material (see paragraph [0040], Shioda). In light of the above, the volume hologram layer used in Example 1 which shows the same range of breaking strain at 25°C and 120°C as that of Shioda was used in this experiment.

[Table 1]

<b>Polymethyl methacrylate-based resin (molecular weight 200,000)</b>	<b>500 parts by weight</b>
<b>3,9-diethyl-3'-carboxymethyl-2,2'-thiacarboxyanine iodine salt</b>	<b>5 parts by weight</b>
<b>Diphenyl iodonium hexafluoro antimonate</b>	<b>60 parts by weight</b>
<b>2,2'-bis[4-(acryloxydiethoxy)phenyl]propane</b>	<b>800 parts by weight</b>
<b>Pentaerythritol polyglycidyl ether</b>	<b>800 parts by weight</b>

(2) Conditions (i) to (iii) shown below were applied to the heat sensitive adhesive layer.

(i) As a heat-sensitve adhesive, AQUATEX EC-1700 manufactured by Chuo Rika Kogyo Corporation (disclosed in paragraph [0179] of Shioda) was used.

(ii) As fine particles, HIPRESICA FQ N2N manufactured by UBE-NITTO KASEI CO., LTD., silica beads having particle size of 4 µm (disclosed in Illustrative Example 12, line 12, Colum 44 of Morii), was used.

(iii) Compounding ratio in a proportion of 1 part by weight of fine particles, silica beads HIPRESICA FQ N2N, to 9 parts by weight of heat-sensitive adhesive, AQUATEX EC-1700 solids (the same compounding ratio as that disclosed in line 13, Colum 9 of Killey), was employed.

### 3. Evaluation

Measurement result of the breaking strain of the heat sensitive adhesive layer (the stress-strain curve (S-S curve)) is shown in FIG. 1. As FIG. 1 demonstrates, the breaking strain at 25°C of the heat sensitive adhesive layer (20 µm) was 80% or higher and it was prominently higher than the range specified in the above (A). Further, the breaking strain of 6 % of the volume hologram layer measured at 25°C was also excessively higher than the range specified in the above (B).

Next, the volume hologram transfer foil was produced by using materials mentioned above sections 2 (1)-(2) and in the same manner described in Example 1 of the present application. The manner described in Example 1 was applied to this Experiment because it is the same producing manner as that of Shioda. A film thickness of the heat sensitive adhesive layer of the volume hologram transfer foil thus produced was 11 µm.

Further, an evaluation of the heat transferring property was conducted in the same manner as the present application. As result, it was found out that a foil cutting property was poor, burr was generated, and excellent transfer to a transferred body was impossible because of elongation of the heat sensitive adhesive.

Instead of TENSILON universal tester RTA-100 (manufactured by ORIENTEC Co., Ltd.) used in Shioda for measuring the breaking strain of the volume hologram layer, INSTRON universal tester 5500 (manufactured by INSTRON) and INSTRON universal tester (manufactured by MERILIN) were used for measuring the breaking strains of the volume hologram layer and the heat sensitive adhesive layer respectively. Same as the measuring condition disclosed in Shioda, a tension Speed of 2 mm/min was applied in the Experiment.

#### 4. Conclusion

The experimental result proves that the respective breaking strain of the heat sensitive adhesive layer and the volume hologram layer at 25 °C do

not meet the ranges recited in the above (A) and (B), even where fine particles used in Morii was added into the heat sensitive adhesive layer of the transfer film disclosed in Shioda by the ratio applied in Killey.

Therefore, the volume hologram transfer foil of the present application is not obvious over Killey, Morii and Shioda.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated this 8 th day of July, 2008

Nobuko OIKAWA

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